NOTES

Openness or Secrecy? Industrial Espionage in the Dutch Republic

Karel Davids
Vrije Universiteit Amsterdam

Introduction

Foreign travellers in the Dutch Republic were not seldom surprised about the ease with which they could gather information about industrial technology. When Samuel Buschenfelt and Christoffel Polhem on their technological journey through western Europe made by order of the Swedish Board of Mines in the mid-1690s arrived in the Dutch Republic, they noticed that the Dutch were not as distrustful and secretive as people of other nations, the English included[1]. A *Hof-und Kammerrat* of the Duke of Brunswick, Johann Ludwig Oeder, travelling through England and Holland to study agriculture and industry in 1763, compared the openness in the Dutch Republic favourably with the tendency to secrecy he encountered in England. «It is fortunate to have a chance to take a look at everything, or at least at those things which are most important, and to have only to think about why things are done in a particular way, as in paper making or linen bleaching. In how many trades are certain benefits, methods or compositions not kept secret out of private interest, as for instance in borax refining, glass making, leather working or tin alloying in England?» Oeder mused[2]. Johann Grimm in an account of a journey in Holland in 1774 extolled the hospitality of Dutch bleachers. «Go to a factory in Paris», he exclaimed, «and see whether one is more willing to show the tricks of the trade than the bleachers in Haarlem». And to drive the point home he added: «I know from my own experience that the opposite is true»[3]. With so

[1] University Library Uppsala Ms.X 306, S.Buschenfelt, 'Berattelse till Bergscollegium om en resa till Tyskland, Nederlanderna, England och Frankrike 1694-1697', fo.28.
[2] Johann Ludwig Oeder, *Beyträge zur Oekonomie Kameral und Polizeywissenschaft*, (Dessau, 1782), p. 162.
[3] Johann Friedrich Carl Grimm, *Bemerkungen eines Reisenden durch Deutschland, Frankreich, England, und Holland in Briefen an seine Freunde*, (Altenburg, 1775), vol. 3, p. 363.

much openness one wonders whether there was any need for spying missions in Holland at all.

Yet the eminent French chemist and sometime Minister of the Interior Jean Chaptal recalled in 1807 that it was the French invasion of Holland in 1795 which had finally opened «les ateliers de cette nation industrieuse» and enabled his countrymen to observe «par nous-mêmes, tous les procédés dont le secret avoit enrichi jusqu'ici ce pays» [4]. Even in the Dutch Republic, information on technology could apparently not always be collected at will. Access to knowledge had its limits. There were still secrets left that were not easily disclosed.

Industrial espionage in the early modern period has during the past few decades given rise to a considerable amount of research. Up to now, this research has been largely concerned with espionage in the country which in the eighteenth century became the leading centre of technological advance in Europe, Great Britain. These investigations largely relate to technological travels made by French, Germans, Austrians, Swedes or Russians to the British Isles in the eighteenth and early nineteenth centuries [5]. Technological travelling in the reverse direction has been less often an object of inquiry [6]. Industrial espionage in the United Provinces by travellers from Britain or other countries in Europe has hardly received any systematic attention at all. Yet the development of this phenomenon in the Dutch Republic deserves closer scrutiny as well.

There are two good reasons for such an inquiry. First of all, the Dutch Republic in the eyes of expert observers in the past and eminent historians

[4] J.A. Chaptal, *Chimie appliquée aux arts*, 4 vols. (Paris, 1807), vol. III, p.6, M.M.G. van Strien-Chardonneau, *Le voyage de Hollande. Récits de voyageurs français dans les Provinces-Unies 1748-1795*, (Leiden, 1992), p. 207.

[5] J.R. Harris, 'Industrial Espionage in the Eighteenth Century', in *Essays in Industry and Technology in the Eighteenth Century: England and France*, (Hampshire, 1992), pp. 164-175, idem, 'Attempts to Transfer English Steel Techniques to France in the Eighteenth Century', in Harris, *Essays*, pp. 78-112, idem, 'The First British Measures against Industrial Espionage', in I. Blanchard, A. Goodman and J. Newman (eds.), *Industry and Finance in Early Modern History. Essays presented to George Hammersley*, (Stuttgart, 1992), pp. 205-225, Paul W.Roth, 'Industriespionage im Zeitalter der Industriellen Revolution', *Blätter für Technikgeschichte*, 38 (1976), pp. 40-54, W.Kroker, *Wege zur Verbreitung technologischer Kenntnisse zwischen England und Deutschland in der zweiten Hälfte des 18. Jahrhunderts*, (Berlin, 1971), H.J.Braun, *Technologische Beziehungen zwischen Deutschland und England von der Mitte des 17. bis zum Anfang des 18. Jahrhunderts*, (Düsseldorf, 1974), W.Weber, 'Industriespionage als technologischer Transfer in der Frühindustrialisierung Deutschlands', *Technikgeschichte*, 42 (1975), pp. 287-306, idem, 'Probleme des Technologietransfers in Europa im 18. Jahrhunderts. Reisen und technologischer Transfer', in U.Troitzsch (ed.), *Technologischer Wandel im 18. Jahrhundert* (Wolfenbüttel 1981), pp. 189-217, H.Freudenberger, 'Technologie-Transfer von England nach Deutschland und insbesondere Österreich im 18. Jahrhundert', in Troitzsch (ed.), *Technologischer Wandel*, pp. 105-124, S.Rydberg, *Svenska studieresor till England under Fribetstiden*, (Uppsala, 1951), Svante Lindqvist,

today showed a remarkable level of technological skill. If technological leadership is taken to mean that a given region, town or cluster of towns plays an initiating role in the development of new technologies in a wide variety of fields, then the Dutch Republic can indeed be said to have held this leading position in Europe between about 1600 and the rise of Britain in the first half of the eighteenth century [7].

Secondly, industrial espionage in the Dutch Republic evolved in a different way than in the British Isles. It did not only take a longer time to arise, the circumstances under which it emerged were also quite unlike those prevailing in Britain. Espionage, J.R.Harris has written, «is of course only one end of the intelligence spectrum in industrial as in defence information gathering». Intelligence about technology could also be acquired without ever doing anything by stealth [8]. Now, the Dutch Republic was during the larger part of its existence (c. 1580 - 1795) a place where information on technology could be gathered by other means than conducting secret inquiries or sending out undercover agents. Data were normally not collected on the sly.

Openness of knowledge, I will argue in this essay, was for a long time *de facto* the rule in the United Provinces as far as matters of technology was concerned. But there were exceptions to the rule, I will show next, and these became more prominent as time wore on. As the number of checks on the transfer of knowledge increased, so the gathering of information on methods, tools or machinery used in Holland more often assumed the form of what might

Technology on Trial. The Introduction of Steam-power Technology into Sweden 1715-1736, (Uppsala, 1984), Michael Flinn, 'The Travel Diaries of Swedish Engineers of the Eighteenth Century as Sources of Technological History', *Transactions of the Newcomen Society*, 31 (1957/59), pp. 95-109, E.Robinson, 'The Transference of British Technology to Russia, 1760-1820', in B.M.Radcliffe (ed.), *Great Britain and her World 1750-1914. Essays in honour of W.O.Henderson*, (Manchester, 1975), pp. 1-25.

[6] One of the few exceptions is A.E.Musson, 'Continental Influences on the Industrial Revolution in Great Britain', in Radcliffe (ed.), *Great Britain and her World 1750-1914*, pp. 71-85.

[7] The concept of 'technological leadership' has been employed by (among others) Edward Ames and Nathan Rosenberg, 'Changing Technological Leadership and Industrial Growth', *The Economic Journal*, 73 (1963), pp. 13-31, D.S.L.Cardwell, *Turning Points in Western Technology, Science and History*, (New York, 1972), pp. 190, 206, A.E.Musson and E.Robinson, *Science and Technology in the Industrial Revolution*, (Manchester, 1969), p. 9, Joel Mokyr, *The Lever of Riches. Technology and Economic Progress*, (Oxford, 1990), p. 207, Harris, 'Industrial Espionage', p. 164; see also Karel Davids 'Technological Change and the Economic Expansion of the Dutch Republic, 1580-1680', in K.Davids and L.Noordegraaf (eds.), *The Dutch Economy in the Golden Age. Nine Studies*, (Amsterdam, 1993), pp.79-104 and idem, »Shifts of Technological Leadership in Early Modern Europe', in K.Davids and J.Lucassen (eds.), *A Miracle Mirrored. The Dutch Republic in European Perspective*, (forthcoming, Cambridge, 1995).

[8] Harris, 'Industrial Espionage', pp. 164-165.

rightly be called «industrial espionage». The question adressed in the final section of this essay is therefore, why the practice of openness in the last decades of the Republic's existence ultimately gave way to a tendency to secrecy.

Openness of knowledge

The practice of openness in the Dutch Republic was not a testimonial of poverty. The Dutch did not adhere to a policy of «open door» because they had simply nothing to hide. The relative infrequency of industrial espionage in the United Provinces as compared with, for instance, eighteenth-century Britain, was in no way due to a low level of technological development. On the contrary, the Dutch Republic was in Europe regarded as highly advanced in almost every field of technological activity, with the major exceptions being metal working and mining techniques.

Interest in the technological achievements of the Dutch was increasing since the beginning of the seventeenth century and reached its peak between around 1680 and the end of the eighteenth century. Technical knowledge was in one form or another transmitted from the Dutch Republic to virtually every state of any importance in Europe — to England, Scotland, France, Portugal, Spain, Tuscany, Venice, Lombardy or Switzerland as well as to the Southern Netherlands, Austria, Bavaria, Hamburg, Denmark, Sweden, Brandenburg-Prussia, Poland and Russia, and even outside Europe, to the West-Indies, North-America, India, Java and Japan[9].

The range of methods by which information on the technological achievements of the Dutch was diffused, extended nearly across the entire spectrum of intelligence gathering, and especially so during the heyday of technology transfer after about 1680: movement of workers and entrepreneurs abroad, export of machines, tools and implements — ranging from cards, heckles or ploughs down to mud mills, saw mills, cloth presses or ribbon frames — sale of technical literature to foreigners (in Dutch or in translation), enrollment of foreigners as apprentices or migrant labourers, information on technical achievements via correspondance of ambassadors, envoys or merchants' agents. And not surprisingly, travellers from foreign countries were for official reasons or private motives often extremely eager to see with their own eyes how the Dutch exactly accomplished the technological feats for which they were so widely renowned.

The Elector of Brandenburg in 1642 commissioned an engineer Hans Georg Memhardt to make a journey to the United Provinces to examine

[9] On the evolution of technology in the Dutch Republic up to 1680 see Davids, 'Technological Change'. Transfer of technology from the Dutch Republic is more extensively discussed in my book in preparation on the technological development in the early modern Netherlands.

windmills used for drainage [10]. The Swedish mercantilist author Johan Risingh in 1670 after a visit to the Netherlands drew up an elaborate account of what was then regarded as Holland's «gold mine», the herring fisheries [11]. And when in the 1660s Jean Baptiste Colbert set out to rebuild the French Navy, one of his first initiatives was to dispatch three missions to the Dutch Republic and to England with the task of providing him with detailed reports on the organization and practice of ship construction [12].

The incidence of technological travelling to the Dutch Republic, in common with the evolution of technology transfer from the Republic at large, reached its all-time height in the period between around 1680 and the end of the eighteenth century. The growth in the number of technological journeys had much to do with the intensified efforts of governments in most of the larger states in Europe to strengthen their economic base by encouraging manufacturing, agriculture and commerce in a systematic, organized way. And although Britain in the course of the eighteenth century indeed came to exert a strong attraction on travellers from all corners of the Continent [13], the Dutch Republic, too, retained a powerful appeal. Indeed, a number of the Continental travellers who are well-known for their exploits in England, like the Swedes Jonas Alströmer, Henrik Kalmeter and Samuel Schröderstierna, or the Frenchmen Blaise Ollivier, Gabriel Jars and Bonaventure le Turc, also made extensive tours through Holland [14]. Englishmen were in the second half of the eighteenth century still making technological journeys to the United Provinces as well: witness the account by John Smeaton of his journey through the Low Countries to study windmills and civil engineering projects in 1755, or Joseph Marshall's description of his tour in the United Provinces to study manufacturing and agriculture in 1768 [15]. For anyone interested in state of the

[10] G.Galland, *Hohenzollern und Oranien. Neue Beiträge zur Geschichte der niederländischen Beziehungen im 17. und 18. Jahrhundert und anderes*, (Strasbourg, 1911), pp. 25-26.

[11] University Library Uppsala, Ms.Palmskiöld 81 no.17 fo. 156-175v, 'Om Hollands häring sille fiskerye'.

[12] Pierre Clément (ed.), *Lettres, instructions et mémoires de Colbert*, 7 vols., (Paris, 1861-1882), vol. III 1 pp. 236-237, 336, 351, 403, III 2, pp. 290-348.

[13] See the literature cited in note 5.

[14] Rydberg, *Svenska studieresor*, Flinn, 'Travel Diaries', Lindqvist, *Technology*, Harris, 'Industrial espionage', 171, D.H.Roberts (ed.), *18th Century Shipbuilding. Remarks on the Navies of the English and the Dutch from Observations made at their Dockyards in 1737 by Blaise Ollivier, Master Shipwright of the King of France*, (Rotherfield, 1992), Gabriël Jars, *Voyages métallurgiques*, 3 vols., (Lyons/Paris, 1774-1781), vol.I, p. XXIV, vol. II, pp. 529, 560-569, vol. III, pp. 322-327, 342-344, 358-384, Koninklijke Bibliotheek The Hague Ms. 74 H 50, 'Journal du voyage fait en Hollande avec M.Malesherbe en 1776'.

[15] *John Smeaton's Diary of his Journey to the Low Countries* (Lemington Spa, 1938), pp. 18-56, Joseph Marshall, *Travels through Holland, Flanders. Germany ... in the years 1768, 1769 and 1770*, 2 vols., (London, 1772), vol. I.

art technology in paper making, oil pressing or timber sawing, the Dutch Republic was at that time still the place to go. This was true in a most ironic sense. When a French invasion army in January 1795 triumphantly marched into Holland, a *citoyen* Carré, who had been attached to the armies of the North to «recueillir dans les pays conquis tous les objects d'arts et de sciences qu'ils renfermaient», was especially commissioned to make drawings and descriptions of wind-powered saw mills, in order that similar mills might be erected in France [16].

Now, before the last decades of the eighteenth century it occasionally happened that foreign travellers in the Republic employed stratagems that might be considered as typical for industrial espionage. A master shipwright of France, Blaise Geslain, for instance, who in 1739 undertook a journey to Holland on the instigation of the French government to study Dutch shipbuilding practice, preferred to traverse the country under the most ordinary name of Dubois [17]. A librarian of Peter the Great, Johann Daniel Schumacher, who in 1721 travelled on a scientific mission to western Europe by order of the Czar, devised an effective way to find out about the inner workings of a water-powered silk throwing mill installed in 1681 near the pleasure-house *Zijdebalen* of Jacob van Mollem at Utrecht, which was famed as one of the technical wonders of the Dutch Republic. After first gaining so much Van Mollem's confidence that he was invited to spend every day at the pleasure-house for two weeks on end, Schumacher took an expert mechanician from Amsterdam, Johann Kaschube, with him to *Zijdebalen,* dressed up as a footman. While the host was enjoying the company of his learned guest from Russia, nobody took notice of the common footman who now and then happened to take a stroll to the building where the mill was housed. And yes, Schumacher was indeed highly pleased with the detailed drawings made by his fellow conspirator! [18]. Even the Swedes Buschenfelt and Polhem who eulogized the spirit of openness which prevailed in the Dutch Republic sometimes had recourse to a ruse in order to obtain the information they wanted. On their visit to the silk-throwing mill of Van Mollem in 1694, which was then apparently as difficult of access as it would be in 1721, they posed as humble, slow-witted, slightly odd fellows, who needed to have everything explained twice before they could even begin to grasp what all the mechanisms were about. In short, no security risks. Needless to say that Buschenfelt's travel account contains a detailed description and drawing of the Van Mollem mill [19].

[16] Archives Nationales Paris, F 12 1299 B.
[17] Roberts (ed.), *18th century Shipbuilding*, p. 27.
[18] R.H.Vermij, 'Bedrijfsspionage in de achttiende eeuw. Een agent van de tsaar te "Zijdebalen"', *Maandblad Oud-Utrecht*, 63 (1990), pp. 107-110.
[19] University Library Uppsala Ms.X 306, Buschenfelt, 'Berättelse', fo.22-24, cf.also his account of their inspection of ribbon frames, fo.27-28.

Secrecy and espionage

It was not until the last decades of the existence of the Dutch Republic that travel accounts of foreigners refer more frequently to the problems being encountered when attempts were made to get access to sites of technological interest. When the French engineer Bonaventure Le Turc in 1776 tried to enter a cloth mill in Utrecht which housed a new sort of carding machine, he found the passage barred by an unyielding female gatekeeper[20]. Travellers from Prussia in 1770 and the early eighties reported to have been told during their stay at the textile-making town of Haarlem, that no factories could be shown to visitors without an official permit[21]. Paper makers in the Zaan district in 1774 proved to be unwilling to disclose to a Swedish traveller J.J. Björnstahl the secret of how they got their paper so well-glued and perfect white[22]. A Gymnasium professor from Karlsruhe, Germany, Heinrich Sander, related on his visit to the paper mills of Honig in the same region two years later that he had been allowed to inspect everything he wanted except for the engines to beat rags, the hollanders[23]. By the mid-eighties, bleachers in Holland turned out to be no longer so courteous as Grimm had found them a decade before. When a technological traveller from Prussia, Friedrich Eversmann, asked permission to inspect a bleaching works near Haarlem, the master of the establishment told him in plain Dutch: «Neen mijnheer, daar is hier in het geheel geene occasie toe!» — which means in plain English: «No sir, no way!»[24].

Besides textile production, paper making and bleaching, the branch of manufacture in the Dutch Republic where the tendency to secrecy made its furthest advance was the chemical industry. When Samuel Schröderstierna, as employee of the Board of Mines in Sweden, in the late 1740s made a technological journey through Denmark, Holland, England, France and Germany, he still had the opportunity in Amsterdam to make a thorough inspection of a refinery of borax and camphor and have a lengthy talk with its director, Diederik Smidt. The account of his voyage indeed contains detailed drawings of the refinery's interior and of its various pieces of equipment[25]. By contrast, travellers in the Dutch Republic during the last decades of the

[20] Koninklijke Bibliotheek, The Hague, Ms. 74 H 50 'Journal du voyage fait en Hollande avec M.Malesherbe en 1776', fo.156.
[21] University Library Amsterdam, Coll. Pijnappel XVI E 1, 'Anmerkungen auf meiner Reise nach Holland im Jahr 1770', fo.30, Friedrich August Alexander Eversmann, *Technologische Bemerkungen auf einer Reise durch Holland*, (Freyberg/Annaberg, 1792), p. 74.
[22] J.J.Björnståhl, *Reize door Europa en het Oosten*, (Utrecht/Amsterdam, 1783), p. 443.
[23] Heinrich Sander, *Beschreibung seiner Reisen durch Frankreich, die Niederlande. Holland, Deutschland und Italien*, 2 vols. (Leipzig, 1783-1784), vol. I, p. 574.
[24] Eversmann, *Technologische Bemerkungen*, p. 124.
[25] Kungliga Biblioteket Stockholm, Ms. X 303 1-4, Samuel Schröderstierna, 'Dagbök rörande handel, näringen och manufakturer...', vol. I, pp. 70, 75-80.

eighteenth century found it extremely hard to get an inside view of chemical manufactories. Factories for refining borax or camphor, or workshops for making litmus, cinnabar, blue or white lead in Amsterdam, Rotterdam or the district of the Zaan were at that time by all accounts kept firmly closed from the piercing gaze of curious observers [26]. In a record of industries and objects which in vain he had tried to inspect during his visit to Holland in 1764, a Danish traveller Christian Martfeldt listed a large number of chemical trades. Among the acquaintances that Martfeldt had struck up with, as another list proves, was the owner of a litmus factory in Utrecht, Wijnand Koopman. But a note next to his name reads: «refused to show me the factory» [27]. A Danish spy Ole Henckel, passing himself off as a merchant, in 1782 made an ill-fated attempt to gain access to mills for making blue in Zaandam [28]. Not surprisingly, the sector of the economy that Chaptal had in mind when writing in 1807 on the unrevealed secrets of the Dutch was first and foremost the chemical industry.

Travellers could of course in various ways attempt to circumvent the barriers encountered during their inquiries in Holland. Though the tricks used by Schumacher or by Polhem and Buschenfelt could no longer be practised once access to a site had been completely denied, there were still several other methods in which intelligence could be collected, as travel accounts reveal. A classic ruse was employed by Le Turc at the entrance of the Utrecht cloth factory in 1776. He simply slipped by at a moment when the janitor was not looking because she was being distracted by three of four other people who addressed her near the door [29]. If an inspection on site could not be achieved, travellers sometimes attempted to get the information they wanted by talking with employees [30]. Employees, if necessary, could be bribed, or even enticed to take their skills abroad. A foreman of a factory in Amsterdam in the 1770s was willing to sell for 50 pounds a secret process of making green paint to England [31]. The *Riksbank* of Sweden between 1757 and 1759 succeeded through the intermediary of a merchant Hendrik Keysberg in Amsterdam in luring away a few paper makers from the Zaanstreek to its paper mill at Tumba

[26] See e.g. University Library Amsterdam Coll. Pijnappel XVI E 1, fo.34-34v, Johann Jacob Volkmann, *Neueste Reisen durch die Vereinigten Niederlande vorzüglich in Absicht auf die Kunstsammlungen, Naturgeschichte. Oekonomie und Manufakturen* (Leipzig, 1783), p. 333, Eversmann, *Technologische Bemerkungen*, pp. 25-32, 34.

[27] Det Kongelige Bibliotek, Copenhagen, Ny Kongl.Samling, 77 d (quarto), 'Christian Martfeldts reise til Irland i 1764', cf. 129 d (folio), 'Reise-journal'.

[28] Riksarkivet Oslo, Privatarkiv nr. 157, Blaafarvaerk, Indberetning fra Ole Henckel for September samt November qvartal 1782, fo. 264-277 par. 189 - 198. I am grateful to prof. Dan Christensen (TISK - Projektet, Roskilde University, Denmark) for sharing with me this valuable reference.

[29] Koninklijke Bibliotheek The Hague Ms. 74 H 50, 'Journal du voyage fait en Hollande avec N.Malesherbe en 1776', fo. 156.

[30] See e.g. Eversmann, *Technologische Bemerkungen*, p. 124.

[31] *De Vaderlander*, 4 (1779), p. 82.

in order to supervise the manufacture of paper for Swedish banknotes[32]. And the account by Eversmann on the export of cloth presses in the 1780s proves that foreigners were able to smuggle vital equipment from the country, by simply carrying it away in parts[33].

A policy of openness

The openness of knowledge in technological affairs that for a long time prevailed in the Dutch Republic was never openly proclaimed an official goal of policy. There was no such thing as an ideology that put a premium on the accessibility of information in technological affairs. One looks in vain for a kind of positive statement of the value of liberal communication regarding technological skills.

In practice, however, a code of openness seems to have been in operation in the United Provinces as soon as this country had *de facto* become a sovereign state. The States General or the provincial governments in the Republic for a long time barely put any obstacles in the way of the outflow of technical knowledge. Skilled workers were free to leave the Republic for other countries if they wished. Tools, machines or implements could be carried abroad without virtually any kind of legal restriction. In contrast to Italian city states since the later Middle Ages[34], or to Britain since around 1700[35], the Dutch Republic for a long time hardly had any prohibition order on the export of technology on the statute-books. The main exceptions were a ban on the export of madder plants and implements for madder cultivation proclaimed in 1624, and embargos on the export of whaling utensils which were repeatedly issued during the

[32] H. Voorn, *De geschiedenis der Nederlandse papierindustrie, dl.1 De papiermolens in de provincie Noord-Holland*, (Wormerveer, 1960), pp. 88-90.

[33] Eversmann, *Technologische Bemerkungen*, p. 8.

[34] Eliyahu Ashtor, 'The Factors of Technological and Industrial Progress in the Later Middle Ages', in Ashtor, *Technology, Industry and Trade. The Levant versus Europe. 1250-1500*, (Hampshire, 1992), pp. 20-21, W.Endrei and W.von Stromer, 'Textiltechnische und hydraulische Erfindungen', *Technikgeschichte*, 41 (1974), p. 99, A.Gasparetto, *Il vetro di Murano dalle origine ad oggi*, (Venice, 1958), pp. 70, 110-113, Eleanor S. Godfrey, *The Development of English Glassmaking, 1560-1640*, (Oxford, 1975), p. 8, C. Poni, 'Archéologie de la fabrique: la diffusion des moulins a soie "alla bolognese" dans les états vénitiens du XVIe au XVIIIe siècles', *Annales. Économies. Sociétés. Civilisations*, 27 (1972), pp. 1475-1496, idem, 'All'origine del sistema di fabbrica: tecnologia e organizzazione produttiva dei mulini da seta nell'Italia settentrionale (sec. XVII-XVIII)', *Rivista Storica Italiana*, 88 (1976), pp. 444-445.

[35] Harris, 'Industrial Espionage', p. 166, idem, 'The First British Measures', idem, 'Movements of Technology between Britain and Europe in the Eighteenth Century', in David J.Jeremy (ed.), *International Technology Transfer: Europe, Japan and the USA 1700-1914*, (Aldershot, 1991), pp. 9-30.

seventeenth century[36]. By and large, the flow of skills and equipment could for more than a century and a half proceed almost unhindered.

A few times before the middle of the eighteenth century government authorities in the Dutch Republic were indeed urged to take action against the emigration of skilled workmen and the export of machinery which were believed to spell ruin for industries in the United Provinces. When during the 1680s the number of fine-blade saw mills of the Dutch type in the Baltic area — notably at Riga and Narva, thanks to the efforts of Dutch merchants and millwrights — rapidly increased, sawmillers in the province of Holland complained to the States of Holland about 'selfish people' intent upon destroying the lumber-sawing industry in the Dutch Republic by having their timber sawn in the Baltic and subsequently imported and sold in the Republic. But counter-measures were not forthcoming[37]. In 1728, the States General received a pressing message from their envoy in Spain, Frans van der Meer, on the subject of the continued recruitment of weavers and spinners from Leiden to the royal cloth manufactory founded in Guadalajara. Van der Meer pointed out that weavers and spinners from Holland still kept arriving in large numbers in Spain, even if he had for several years tried almost any means to lure workers who had settled with their families in Guadalajara back to the Netherlands, and to discourage those who had stayed at home to follow their trail. The total size of the Dutch community in the Spanish town had by 1720 already grown to about 300. Van der Meer suggested that the States General prohibit further recruitment of Dutch cloth workers to Spain. And yet, the States of Holland, which had taken the letter up for discussion shortly after its receipt, again signally failed to act[38].

How could this virtual openness of knowledge in the Dutch Republic arise and how could it persist for so long ? In view of the absence of any sort of justification in ideological terms, the phenomenon appears to have more the result of a particular combination of circumstances than the outcome of deliberate choice. The political structure of the Republic of the United Provinces which emerged out of the Dutch Revolt made it certainly a hard task to take effective measures against the diffusion of professional secrets abroad. Unlike the Republic of Venice or the Kingdom of Great Britain, which enacted prohibition orders on the emigration of craftsmen or the export of machinery at

[36] W.D.Voorthuijsen, *De Republiek der Verenigde Nederlanden en het mercantilisme*, (The Hague, 1975), pp. 46-65.

[37] C.A.Davids, 'The Transfer of Windmill Technology from the Netherlands to North-Eastern Europe from the 16th to the Early 19th Century', in J.Ph.S.Lemmink and J.S.A.M.van Koningsbrugge (eds.), *Baltic Affairs. Relations between the Netherlands and North-Eastern Europe 1500-1800*, (Nijmegen 1990), p. 48.

[38] C. Pauw, 'De Spaanse lakenfabrieken te Guadalajara en de Leidse lakenindustrie in het begin der achttiende eeuw", *Economisch Historisch Jaarboek*, 24 (1950), pp. 46, 69-70.

a rather early stage of their technological advance, the Republic of the United Provinces after all had a highly decentralised system of government. The States General were no Parliament, the Stadholder was no King, the Council of State no Cabinet, and Amsterdam never possessed the dominance in the Dutch Republic that Venice enjoyed in the Venetian Republic. The enactment of orders by the States General which had force of law for the whole territory of the state, required deliberations between all seven allied provinces, if possible unanimous consent and certainly approval by its most important member, the province of Holland. Inside each separate province, the approval of measures presupposed consultations between the varying number of members of which the provincial estates were composed — in Holland, for instance, between eighteen cities and a representative of landed aristocracy. If merely a few of the larger cities refused to agree, the odds were that no decision would be taken at all and the *status quo ante* tacitly maintained[39].

But though decision-making in the United Provinces was indeed a laborious process, it still could produce concrete results and in the end even would generate measures against the export of technical knowledge. The reasons why the States General or the States of Holland for a long time failed to take action against the outflow of technology thus did not only reside in the nature of the decision-making process itself. It was also a matter of different priorities.

For one thing, many citizens of the Republic had in reality a stake in the export of technical knowledge. Transfer of technology was after all a source of income for entrepreneurs and craftsmen alike; investing in foreign countries, teaching foreign apprentices, trading skills to foreign employers or selling tools, machines and implements to customers abroad generated a lot of earnings for numerous people in Holland. And the pursuit of private gain was in the Dutch Republic commonly not considered an unlawful or immoral act.

At a more aggregate level of priority rating, interests of trade in the policy of the States General or the States of Holland normally took precedence over the interests of other sectors of the economy. The main object of economic policy was protection of the staple market. Its chief purpose was to keep the Dutch Republic in the centre of the flows of world trade. Promotion of agriculture or encouragement of inland industry only took second place. Although the States General to some extent *did* practise a modest measure of protectionism of these economic sectors by means of tariff lists, it never went so far as to develop a concerted policy for the advance of agriculture or manufacture on the model of other major states in Europe in the late seventeenth and eighteenth centuries. In contrast to Sweden, Denmark, France, Russia, Austria, Brandenburg-Prussia, Portugal, Spain, Britain and even Venice, the Dutch Republic never had government bodies like a Board of Mines, a Bureau of Commerce, a College of Manufactures, a Linen Board or a *Kriegs-und Domänenkammer*, concerned with

[39] G. de Bruin, *Geheimhouding en verraad. De geheimhouding van staatszaken ten tijde van de Republiek (1600-1750)*, (The Hague, 1991).

the supervision, encouragement or mere registration of industrial or agricultural activities. Except for the Admiralty of Amsterdam [40], no central or provincial agency in the Dutch Republic ever organised a technological journey to a foreign country to recruit skilled workmen or gather specialist information that would benefit the development of the national economy. The inflow or outflow of technical knowledge was not a concern of central or provincial agencies of government. No wonder they so long refrained from taking counter-measures against the export of technology.

The only public bodies in the Republic that *did* show an active interest in the promotion of industry, were governments of individual cities. And these were precisely the first agencies that were prepared to take measures to prevent the diffusion of technology. The city of Leiden issued a prohibition order on the export of looms as early as 1602 [41]. The magistrates of Haarlem put a ban on the export of looms in 1671 and a few years later entered into a contract for a period of six years with the local makers of ribbon frames to the effect that these would not build or repair copies of ribbon frames for the benefit of customers in other towns, would not teach the art of making ribbon frames to others than their own children or apprentices and would not accept employment outside their native city [42].

From openness to secrecy

The increased incidence of industrial espionage in the Dutch Republic in the later decades of the eighteenth century, as we have seen, reflected a growing tendency for secrecy. Now, this enhanced tendency for secrecy was attended by a reversal of the very policy of openness I have just discussed. The liberal attitude on the subject of technology transfer at last came to an end. Openness of knowledge finally gave way to a system of restrictions and prohibition decrees.

The intriguing thing is, that this protectionist turn became evident from the highest down to the lowest level of policy-making. In the middle of the eighteenth century, the States General proceeded to take the very measures against the export of machinery and skills which the saw-millers and the Dutch envoy in Madrid had asked for in vain a few decades before. In 1751, the

[40] J.R.Bruijn, 'Engelse scheepsbouwers op de Amsterdamse Admiraliteitswerf in de achttiende eeuw', *Mededelingen van de Nederlandse Vereniging voor Zeegeschiedenis*, 25 (1972), p. 18.

[41] N.W.Posthumus (ed.), *Bronnen tot de geschiedenis van de Leidsche lakenindustrie*, 6 vols. (The Hague, 1910-1922), vol. VI, nos. 29, 128, 267, 319, *De geschiedenis van de Leidsche lakenindustrie*, 3 vols. (The Hague, 1908-1939), vol. II, pp. 372-373.

[42] Gemeentearchief (GA) Haarlem, Ambachtsgilden nr. 327 Stadsarchief Loketkas 7.15.7.1 contract 18 November 1678.

Supreme Councillons decreed that henceforth no one was allowed to recruit craftsmen in the Dutch Republic for service abroad, and especially not sawyers, weavers, twiners or rope-makers[43]. In 1752, the States General forbade the export of mills, or parts of mills. Similar bans were imposed on the export of ribbon frames (1753), and on the sale to foreign customers of tools and equipment used for distilling (1776), paper making (1781) and the manufacture of white lead (1782)[44]. The States of Holland in 1749 proclaimed a ban on the export of tools and implements employed in silk, woollen and linen manufacture and in 1788 issued a prohibition order on the sales of equipment used in the making of tobacco pipes to customers abroad[45].

Individual cities markedly extended the system of protection of local industries. Before the States General proclaimed a country-wide ban on the export of ribbon frames in 1753, the town of Haarlem in 1749 had already introduced a full-blown registration and inspection system of frames and looms in the linen ribbon industry to prevent any piece of equipment from being exported out of town; any frame or loom that became redundant, would henceforth be bought and stored by the city authorities[46]. The city of Gouda in 1750 set the example for the subsequent measure of the States of Holland by issuing a local bye-law against the export of equipment used for tobacco pipe making[47]. The magistrates of Delft in 1755 ruled that no craftsman in the faience-making industry who had gone to practise his trade outside Delft would ever be allowed to get employment in his native city again or receive assistance from the poor-box[48].

In the chemical industry, one even finds the introduction of counter-measures against espionage at the level of individual firms. It was no coincidence that foreigners were time and again rebuffed when trying to find out the secret of making blue in Zaandam. The factory owners from at least 1751 onwards had taken the precaution of asking a formal pledge from the managing director, laid down by notarial deed, that the director would not divulge the art of making blue to anyone outside the firm on the penalty of paying for all the damage the firm would incur[49]. Henckel's failure to enter the blue mills of Zaandam in 1782 by guile proved that this strategy was not

[43] Cornelis Cau *et al.* (eds.) *Groot Placaet-boeck, vervattende de placaten, ordonnantien ende edicten etc.*, 9 vols., (The Hague 1658-1796), vol. VIII, p. 1272.
[44] *Groot Placaet-boeck*, vol. VIII, pp. 1273-1274, 1281-1282, vol. IX, pp. 1345-1346, 1351-1353.
[45] *Groot Placaet-boeck*, vol. VII, pp. 1624-1625, vol. IX, pp. 1354-1355.
[46] GA Haarlem, Ambachtsgilden nr.161, keur 21 April 1749. J.Vogel, *Een ondernemend echtpaar in de achttiende eeuw.* Pieter Merkman jr., *en Isabella van Leeuwarden: de Haarlemse garenlintindustrie*, (Rotterdam, 1987), pp.37-39.
[47] GA Gouda, Archief Pijpnering 103 no. 73.
[48] GA Delft, Ie Afdeling 11/2 keur 26 November 1755.
[49] GA Zaandam, Oud Notarieel Archief 5447 no. 106, 2 March 1751, 5453 no. 563 19 December 1761.

unsuccessful[50]. The firms for making cinnabar in Amsterdam had by the 1780s agreed among themselves that no visitor from outside would be allowed to inspect one of their factories, without all the others being informed[51]. Thus the diffusion of technical knowledge from the Dutch Republic was increasingly obstructed.

The immediate cause of this shift in the second half of the eighteenth century was no doubt the increased awareness that the very survival of the Dutch manufacturing sector was now at stake. Many industries in the Dutch Republic had during the 1730s and 1740s suffered badly under the growing competition from newly-founded manufactories in other countries of Europe. They saw a precipitous fall in market shares both abroad and at home[52]. The threat of foreign competition became the more grave after 1750 when it turned out that even geographical areas which for decades had been regarded as a kind of safe, natural preserve for exports of manufactured goods from the Dutch Republic viz. the Austrian Netherlands and the Rhinelandt[53] were busily setting up import-substitution industries with the aid of technology imported from Holland. The pressure on those in power to take determined action against the erosion of a mainstay of Dutch prosperity patently increased. During the wave of popular disturbances that swept through the cities of Holland and Zeeland in 1747 and 1748, artisans in Haarlem took the opportunity to press the urban authorities for more forceful measures to prevent further losses of jobs and incomes[54]. In the years that followed, the chancery of the Stadholder and other government agencies in The Hague were overwhelmed with memoranda, petitions and laments from manufacturers in a variety of industries, who depicted their plight in the bleakest of terms and pressed for active support by the States General or the States of Holland[55].

The highest policy-making bodies in the United Provinces never went so far as to exchange their former aloofness for a full-fledged protection of industry. But in face of the worsening situation they were at least prepared to go part of the way, in the sense of taking measures that were evidently intended to prevent further damage to the Dutch economy. The introduction of the prohibition order on the export of mills by the States General in 1752, for example, was

[50] Riksarkivet Oslo, Privatarkiv nr. 157, Blaafarvaerk, Indberetning fra Ole Henckel for September samt November qvartal 1782, fo. 267-274 par. 193-194.
[51] Eversmann, *Technologische Bemerkungen*, pp. 25-26.
[52] J.Hovy, *Het voorstel van 1751 tot instelling van een beperkt vrijhavenstelsel in de Republiek*, (Groningen, 1966), pp. 73-81, J.I.Israel, *Dutch Primacy in World Trade, 1585-1740*, (Oxford, 1989), pp. 383-390, Joh.de Vries, *De economische achteruitgang der Republiek in de achttiende eeuw* (Amsterdam/Leiden, 1959), pp. 83-97.
[53] Hovy, *Het voorstel*, pp. 45, 51.
[54] J.A.F. de Jongste, *Onrust aan het Spaarne. Haarlem in de jaren 1747-1751*, (Amsterdam, 1984), pp. 228-232, 277-281.
[55] Hovy, *Het voorstel*, pp. 262-294.

occasioned by recent efforts of entrepreneurs in the Austrian Netherlands to establish a timber-sawing industry at Ostend, with the aid of hardware and expertise imported from Holland[56].

Yet there was more to this general shift in policy concerning the outflow of technology than merely an adaptation to a change in circumstances. The turn in policy was bound up with a striking transformation in ideology. The preamble of the decree of the States General of 1751 which prohibited the recruitment of workers in the Republic for employment abroad rings a theme that had never sounded before — the theme of patriotic duty. People who for the sake of profit tried to persuade skilled workers to leave the Dutch Republic were now flatly accused of ignoring the duty they owed to the fatherland[57]. A moral obligation to the fatherland, in other words, should take precedence over the pursuit of private gain. Citizens should first and foremost feel concerned for the welfare of the country at large.

But this basic change in ideology did not just affect the political class that held the reins of government. It involved civil society as well. The rise of this 'patriotic' discourse at the highest levels of government after the middle of the eighteenth century reflected without doubt a deeper change in public mood (even if the Dutch Republic was by no means a participatory democracy). The magistrates of Amsterdam in 1747 received an anonymous letter signed 'The Holland Patriot', whose author from a self-proclaimed sense of duty to '[his] fatherland and his city' denounced a manufacturer Carolus Bredero as the instigator of a scheme to lure away skilled workmen in the velvet-making trade to Spain[58]. The theme of the vice of disloyalty versus the virtue of civic spirit time and again recurred in the Dutch spectatorial writings which became more and more popular in the second half of the eighteenth century[59]. The periodical *De Vaderlander* (i.e. 'The Patriot') in 1779 ascribed the loss of the technological edge of the Dutch Republic not only to the unceasing inquiries and briberies by agents of foreign powers, but also to the lack of loyalty of citizens of the Republic themselves[60]. Conversely, the secretiveness that foreign travellers encountered more and more during their visits to Holland in the later decades of the century may in reality well have been inspired by the very sense of civic duty which the spectatorial writers wished to promote. It was in all probability not merely a whim that led Wijnand Koopman in 1764 to refuse Christian Martfeldt access to his litmus factory in Utrecht. Koopman was a prize-winning

[56] Davids, 'The Transfer of Windmill Technology', p. 49.
[57] *Groot Placaet-boeck*, vol. VIII, p. 1271.
[58] GA Amsterdam, Particulier Archief 5028 nr. 546 letter 17 October 1747.
[59] Wijnand W.Mijnhardt, 'The Dutch Enlightenment: Humanism, Nationalism, and Decline', in Margaret C.Jacob and Wijnand W.Mijnhardt (eds.), *The Dutch Republic in the Eighteenth Century. Decline, Enlightenment and Revolution*, (Ithaca/London, 1992), p. 210.
[60] *De Vaderlander*, 4 (1779), p. 82.

author of an essay on the encouragement of trades and industries published by the Provincial Utrecht Society of Arts and Sciences in 1781. In this essay, submitted in 1779 to the society under the pseudonym 'Patriot', Koopman defended the use of protectionist measures to permit the revival of decayed industries, and urged manufacturers to show incessant attention to the smallest detail of their enterprise [61]. Civic duty thus took precedence over the openness of knowledge.

Conclusion

The flow and incidence of industrial espionage has been called 'the acid test of technological fertility and leadership'. According to J.R. Harris, the more a nation is attractive to industrial spies, the more it can be said to possess technological leadership. A prime example was eighteenth-century Britain [62].

This inquiry on industrial espionage in the United Provinces gives cause to take a more differentiated view. The low incidence of espionage in the Dutch Republic up to the middle of the eighteenth century was not an indication that it laboured under a lack of technological fertility, or that in terms of technological achievement was no longer a match for Britain. Conversely, the increased frequency of espionage during the later decades of the eighteenth century did not imply that the Republic had suddenly seen a striking outburst of technological creativity, or had finally moved into the forefront of technological advance. On the contrary, the United Provinces held a leading position in the development of technology in Europe between about 1600 and the rise of Britain in the first half of the eighteenth century [63]. If espionage in the proper sense of the word arose much later in the Dutch Republic than in Britain, this disparity had nothing to do with technological change itself, but with differences in the political and ideological context. The evolution in industrial espionage in the Dutch Republic did not so much reflect the ups and downs of technological leadership as changes in policy and ideological discourse concerning the openness or secrecy of technical knowledge.

[61] Wijnand Koopman, 'Antwoord op de vraag [..] hoe zoude men de fabryken en trafyken, welken in ons land, en, bijzonder, in de provincie Utrecht. zijn, best kunnen inrichten tot algemeen voordeel', *Verhandelingen van het Provinciaal Utregtsch Genootschap van Kunsten en Wetenschappen*, vol. I (1781), 133-206, p. 160, 171.
[62] Harris, 'Industrial Espionage', p. 164.
[63] See note 7.